



Francis Moore House, courtesy Fort Frederica National Monument.

Frederica was not simply a rude garrison town, it was a community of craftsmen, artisans, merchants, and professionals who were hand-picked in England to inhabit the colony. Frederica became an ideal test ground for hypotheses and concepts concerning the American colonial experience and the archeological processes that can reveal details of the past. Frederica is well suited to determine the nature of military-civilian interaction within the frontier town as well as pointing out the variety of socio-economic affiliations of the towns inhabitants.

Frederica's 84 lots contained many tabby houses and outbuildings as well as a history of historical archeology. During the past 52 years, over 45 archeological excavations have occurred at Fort Frederica National Monument. The late Charles H. Fairbanks of the University of Florida conducted the first excavations and mapped out the town. Frederica is an excellent scientific study due to a variety of reasons. It was important to the early colonial history in the southeast and it was a unique isolated site with little post colonial occupation. Most importantly, Frederica contained a cross section of cultural and economic structure of the early American colonies.

Today, Fort Frederica is a 238- acre preserve made up of an 8-acre tract commemorating the Bloody Marsh battle site and 230 acres of the town of Frederica, fort ruins, adjacent buffers, and marshlands across the Frederica River. Only two principal above-ground ruins, segments of the fort and the barracks tower, remain today to remind visitors of the early time of the town. The public interpretation program begins in the park visitor center where a movie, touch computers, exhibits and displays of archeological artifacts help establish life at Frederica in the 18th century. Tabby ruins, including the fort, town ruins, and foundations are the most appealing aspect of the site to visitors today. None of the town was reconstructed

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## Southern Coastal Lime Burning

General James Oglethorpe (1696-1785) was a soldier and a scholar with a determination to make his colony of Georgia work. Other colonies were founded on religious persecution or for the benefit of reaping the natural riches of the land, but the initial colonists sailing to Georgia were selected. Over 600 men were interviewed in England, but only 35 families were finally chosen.

In 1733, housing was initially comprised of wood or in the more rural settings, such as Fort Frederica on St. Simons Island, palm-thatched shelters. Some housing was quickly replaced by "substantial dwellings of brick or tabby; for among the settlers were bricklayers and masons."<sup>1</sup>

The first bricks were sent over as ballast in ships, but by 1734, industrious Salzburgers had begun making bricks. John West of Savannah began his brick operation in 1736 and within the first eight months of 1738 had made more than two hundred thousand. Samuel Holmes, a brick-

layer and mason, arrived in 1737 and before one year had passed had already produced more than one hundred thousand.<sup>2</sup>

Despite the labors of these men, bricks were just not being made in the quantities needed according to colonist Henry Myers in May 1741. "As the bricks were dear and much labor for young beginners, we have fallen upon a much cheaper and better way of making houses, of a mixture of lime and oyster shells (of which we have vast quantities) framed in boxes, which soon dries and makes a beautiful, strong and lasting wall."<sup>3</sup> Mr. Myers was writing of the fore-mentioned Southern coastal building material, 'tabby,' found between roughly Charleston, South Carolina and St. Augustine, Florida and popular from the 16th through 19th centuries.

### Lime Sources

Be it brick or tabby, a necessary ingredient in the building process was lime. The procurement of lime for the early building of the Southern colonies appears to be one of the easier tasks for the settlers. The islands along the coast of South Carolina, Georgia, and Florida were originally occupied by Native Americans, who dined on the

so visitors have the opportunity to use their imagination aided by outdoor exhibits containing reproductions of artifacts actually found at the site.

A major educational initiative is taking place at Fort Frederica with the local school district and supported by a major grants from the Fort Frederica Association and National Park

Foundation. Children in 4th and 5th grades are learning about archeology through a multi-disciplinary program. After learning about the theory of archeology through 15 background lessons, students perform an actual on-site supervised field dig at Fort Frederica on a 30-year-old site of reburied artifacts. The children and teachers then return the artifacts to a full-scale archeological laboratory that was established in the nearby Oglethorpe Point Elementary School. There they clean, classify, weigh, and measure the artifacts as well as write a report on their findings and perform curatorial maintenance on selected pieces. Several identified



artifacts are selected, displayed, and interpreted in exhibit cases inside the school. The program will soon be available throughout the state and possibly around the country with the installation of a Georgia Statewide Academic and Medical Systems (GSAMS) interactive long distance learning center that will be permanently based at the school.

Frederica's tabby ruins stand today as a silent sentinel to the early period of America's colonial past. This primitive concrete mixture

stands to remind visitors and park neighbors of the resourcefulness and adaptation that our original settlers devised to exist and thrive during the early days of the Southeastern Coast.

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plentiful clams and oysters abounding the shores. Typical of their habits, they concentrated their refuse in piles rather than scattering them.

These Indian middens were found by the English and Spanish. Historical references cite their size to be as large as several acres.<sup>4</sup>

The use of shells in making lime was nothing new to the white man, particularly the English. Historical references such as Pliny and Vitruvius were available to cite.<sup>5</sup> On a more contemporary scale, architectural patternbooks and trade treatises had become the rage in Britain over the last century, with more being published each year. One work, *Mechanick Exercises*, by Joseph Moxon, published in 1703, expounded on the trades of smithing, joinery, carpentry, turning, and bricklaying. In his discussion on lime, he states: "But the shells of Fish, as of Cockles, Oysters, & c. are good to burn for Lime."<sup>6</sup>

Oglethorpe, being a scholar, was undoubtedly aware of these works, and apprenticed masons and bricklayers learned of these sources through handed-down knowledge as well. The Indian middens, therefore, must have been a pleasant sight as they readily solved the problem of lime. No search and digging needed to be undertaken to find a

proper clay or stone. The task at hand merely became how to convert these shells into lime.

#### *Lime Kilns or Casts*

Again, current knowledge had its precedent in earlier published books or handed-down knowledge. The Spanish missions in Georgia had already been making lime by building "casts, built of wood, probably cedar" when Oglethorpe arrived.<sup>7</sup> For centuries these casts have been known as "intermittent kilns with mixed feed" where a layering effect of limestone or shell have been alternated with a fuel such as coal or wood. The two materials or "feed" form the kiln and burn together, basically leaving nothing but lime and ash. Early authors such as Pliny and Vitruvius expounded on the employment of "ash" in the setting of mortars; English colonists therefore would not care that wood ash mixed with shell lime during the firing process. "Intermittent" referred to the fact that each burn of a charge (e.g. oystershells) constituted a separate operation. The charge of shells were burned based on the demand of the neighborhood.

Primitive kilns were constructed of stone and located against the side of a hill for easy access to the top and bottom. One early kiln, excavated at

Jamestown, was a crude, funnel-like structure “dug into banks at the river edge (where it was handy to unload the shell).”<sup>8</sup> This form had also been found in St. Augustine, suggesting the use of simple mounds for lime-burning along the coast between Jamestown and St. Augustine.

However, along the Georgia coast, stones and therefore kilns of a more permanent nature were rare. Philip von Reck wrote in 1736: “At the present time all houses here are made of wood, because no stones are found in Georgia, until time is found to bake bricks.”<sup>9</sup>

Modifications had to be made and adapted to fit life in the New World. Oglethorpe copied the Spanish and constructed a lime kiln on St. Simons “south of the German Village and about four miles from Frederica.” This early lime kiln was made by “piling wood and oyster shell, layer on layer, into a great mound.”<sup>10</sup> By November 1736, limeburnings were producing “2 or 300 bushels [of lime] at a time, “ and most of it was used for house construction in the town.<sup>11</sup>

The popularity of the “cast” kiln made of wood and shell layers seemed to remain in Georgia for, in 1830, Thomas Spalding suggested that such a kiln was still in use. “Two days in the week [are] employed in collecting shells and building lime kilns.”<sup>12</sup> Permanent kilns took longer to construct than two days. The “cast” kiln could be done in two days as was done at Wormsloe State Historic Site in Savannah and at Fort Frederica National Monument on St. Simons Island, Georgia.

#### *Re-creation*

These early “cast” kilns were also called “ricks” and continue to be historically re-created today, thereby keeping alive a technique rapidly becoming a “lost art.”<sup>13</sup> For the purposes of obtaining historic lime for an independent research project on tabby, a rick was constructed based on old techniques.

Initially a pit is dug, measuring about 4’ square and 3’ deep. It is filled with pine knots,

heart pine, and other small sources of kindling. This step is very important as the fire must reach extremely high temperatures of around 2000°F for the oystershells (calcium carbonate or  $\text{CaCO}_3$ ) to decompose into a suitable lime. The pit is then edged with a frame of oak or pine tree trunks, each approximately 10” diameter by 8’ long. Two trunks rest on the ground perpendicular to the pit; two more trunks of 6” diameter rest perpendicularly, in a notch, atop these, forming the frame. Between the latter trunks, smaller logs of similar length, but only 3-4” diameter, are laid. Any cracks between the logs open to the pit below are chinked with pine knots or kindling. A second round of 6” diameter logs is built, forming a total of four layers. (Four layers equal one tier.) The logs should be completely covered with a layer of oystershells. These layers of logs and shell form the first section or tier. Subsequent layers of logs, of approximately 8’ long x 6” diameter, are placed perpendicular to the layer below,, and oystershells are then piled atop this until the desired height is achieved. To prevent the popping and flying of oystershells, a final layer of kindling or branches may be placed over the upper layer of shell.

The rick was constructed of two tiers with each subsequent tier being slightly smaller than the last. The logic behind this is that as it burns, the rick will collapse in upon itself rather than fall outward and potentially diminish the heat of the fire.

The intense fire produces glowing, white-hot shells, a visual assurance that the 2000°F temperature was reached. Ultimately, the heat will turn them into a white powder called quicklime ( $\text{CaO}$ ). If combined with the ash in the pit, one obtains the grey color found in tabby.

The rick will maintain a steady fire for about five hours, during which time a ‘watch’ should be kept. After the burn, the pit will be filled with oystershells, giving the appearance that nothing happened. Within several days, however, the shells will mysteriously begin to break down and turn to a white, talcum-like powder.

The rick was left alone for approximately one week to cool and air slake, producing hydrated lime ( $\text{Ca(OH)}_2$ ). This method of slaking is time-honored and seems to work along the Southern coast where humidity is high. Over the last 100 years, textbooks have advocated for the use of slaking lime by covering with water and letting it sit for three weeks. Today, however, hydrated lime is available in bags where the manufacturer has perfected the slaking in a factory setting. After one week, the lime is then removed from the pit, sieved, and stored in air-tight containers prior to use. It will keep indefinitely in a dry place. If rain is forecast during this week, a tent can be erected

*The two-tiered rick is complete and stands ready to be torched. Note that each subsequent layer is slightly smaller than the last. The author is shown in period costume. Photo by Ed Matthews.*





The rick is torched.  
Photo by Ed  
Matthews.

over the pit of lime. During Oglethorpe's and Spalding's eras, work was covered from the elements with palmetto leaves. Do not cover the pit itself. This traps the heat in and the air and moisture out, thereby altering the chemical process of breaking the shell down into a powder.<sup>14</sup>

The rick described above, containing approximately 25 bushels of shell, yields about 10 bushels of quicklime.

#### Condusions

Although St. Simons had kilns for both brick and lime, the vast quantities of oystershells and the fact that Oglethorpe's favorite masonry material was tabby placed a crimp on the brickmaking business until the first demise of tabby by the end of the Revolutionary War and the Savannah fire of 1796 promoted the fireproof qualities of brick.

The procurement of lime was definitely a necessary part of the early building of the Southern colonies. To what extent it would play was not imaginable until Oglethorpe and his men settled the islands of Georgia and found the extensive Indian middens. Several of Oglethorpe's men spread the use of tabby by constructing houses of it, thereby using vast quantities of oystershells for the lime and aggregate.<sup>15</sup> Two of these houses still remain, though in ruins, a tribute to the tabby process.

#### References

- <sup>1</sup> Burnette VanStory, *Georgia's Land of the Golden Isles* (Athens, GA., 1981), p. 130. Tabby is an early coastal cement mix of equal volumes of lime, sand, oystershell, and water. A research project is currently underway on tabby and its restoration.
- <sup>2</sup> Mills Lane, *Architecture of the Old South: Georgia* (Savannah, 1986), p. 19; Allen D. Candler, ed., *Colonial Records*, XXII (Atlanta, 1913), p. 221.
- <sup>3</sup> *London Magazine*, XIV (1745), p. 395.
- <sup>4</sup> Georgia Historical Society, Margaret Davis Cate MSS, 997, folder 175, Box 9. Hereafter known as Cate 997/175/9.

- <sup>5</sup> Vitruvius [Marcus Vitruvius Pollio], *The Ten Books of Architecture*, trans. Morris H. Morgan (New York, 1960); Kenneth C. Bailey, *The Elder Pliny's Chapters on Chemical Subjects* (London, 1932).
- <sup>6</sup> Joseph Moxon, *Mechanick Exercises*, 1703 (reprint, Scarsdale, N.Y., 1979), p. 241.
- <sup>7</sup> John T. Lanning, *The Spanish Missions of Georgia* (Chapel Hill, 1935), p. 3. This work stated that many of the tabby ruins in Georgia were Spanish missions. *Georgia's Disputed Ruins* edited by E. Merton Coulter (Chapel Hill, 1937) disputed this and firmly established the mission buildings as sugar works of a later period.
- <sup>8</sup> A.C. Manucy to M.D. Cate, June 29, 1953, Cate 997/175/9.
- <sup>9</sup> Kristian Hvidt, ed., *Von Reck's Voyage* (Savannah, 1990), p. 34.
- <sup>10</sup> Cate 997/175/9. Curtis Childs, retired Ft. Frederica employee, stated that this site was located two miles from the fort and that the shells were usually burned near the Indian midden as powdered lime was easier to transport than moving the shells to the fort for burning. Childs also noted that between c. 1738 and c. 1746 lime burnings were quite frequent. Interview with Curtis Childs, St. Simons, Georgia, October 2, 1993.
- <sup>11</sup> Robert G. McPherson, *The Journal of The Earl of Egmont* (Athens, 1962), p. 210. In St. Augustine, 7,000 bushels of lime were created from oystershells in a mere six-month period—from August 1671 to the following Spring. Arana, *Castillo de LSan Marcos*, p. 18.
- <sup>12</sup> Thomas Spalding, "On the mode of Constructing Tabby Buildings," *The Southern Agriculturist*, December 1830, p. 619.
- <sup>13</sup> Fort Frederica National Monument has an annual lime-burn in March. The author was a member of the team constructing the 1993 rick at Wormsloe State Historic Site and the 1994 rick at Fort Frederica.
- <sup>14</sup> If rain is forecast before the lime is retrieved, Childs says his pit is *not* covered at all, but upon removal any wet lumps from subsequent rains are removed by sieving.
- <sup>15</sup> The middens served a two-fold purpose: they provided the well-washed aggregate in tabby and some mortars, and as discussed, they were used to produce the ingredient, lime. Some early plantations such as Dungeness on Cumberland Island, Ga. were as high as three stories. One can thus image the size of the ricks these early builders made to yield the lime to construct such massive dwellings. The Noble Jones house ruins are now within Wormsloe State Historic Site.

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